



Docket No.: 8733.120.01-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Woo-Sup SHIN

Application No.: 09/039,438

Filed: March 16, 1998

For: ETCHING APPARATUS

Confirmation No.: 9576

Art Unit: 1763

Examiner: Rudy Zervigon

Customer No.: 30827

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR RECONSIDERATION

Dear Sir:

In response to the Office Action mailed September 20, 2004, wherein pending claims 1-26 are rejected, Applicant respectfully requests favorable reconsideration in view of the remarks presented herein below.

At the outset, Applicant would like to thank Examiner Zervigon for the courtesy extended to Applicant's Representative during the Interview conducted December 27, 2004. A brief summary of the interview is as follows.

The Examiner's interpretation of the Nelson reference (U.S. Patent No. 4,147,581) was discussed, more specifically the Examiner explained his position regarding the structural versus functional disclosure of Nelson. The Examiner explained that although Nelson may not disclose the functional aspects of the claimed apparatus, structural components capable of being reconfigured were disclosed. For example, the Examiner asserted that the piping 7, 8, 30 and 31 of Nelson was equivalent to the claimed limitation of "a connecting passage directly connecting the first and second tanks and directly transferring the separated diluted etchant from the second

“tank to the first tank” despite the fact that Nelson discloses that the piping 7 and 8 is never utilized in conjunction with piping 30 and 31. In other words the material passed through pipe 7 is never passed through pipes 30 and 31(See column 5, lines 17-68 of Nelson). To support this assertion, the Examiner maintained that because the claims were apparatus claims the functional language was not given patentable weight in view of the disclosed structure.

In paragraph 3 of the Office Action (“Action”), the Examiner rejects claims 1, 2, 7, 10, 11, 13, 14, 17-22, 25 and 26 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 4,147,581 to Nelson (“Nelson”), in view of U.S. Patent No. 5,000,795 to Chung et al. (“Chung”), U.S. Patent 4,338,157 to Kanda (“Kanda”), and U.S. Patent No. 5,560,838 to Allies et al. (“Allies”). Applicant respectfully traverses this rejection.

In order to support a rejection under 35 U.S.C. §103(a), the Action must establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness three criteria must be met. First, there must be some motivation or suggestion to combine the applied references. Second, there must be a reasonable expectation of success. Finally, the combination must teach each and every claimed element. In the present case, claims 1, 2, 7, 10, 11, 13, 14, 17-22, 25 and 26 are not rendered unpatentable over the combination of Nelson, Chung, Kanda, and Allies because the Examiner fails to establish a *prima facie* case of obviousness as discussed below.

Independent claim 1 defines an etching apparatus for etching a glass substrate. The apparatus includes, *inter alia*, a first tank including a first etchant; an etch bath having a bubble plate, the etch bath connected to the first tank and receiving the first etchant, the etch bath containing a residual etchant including a diluted etchant and residue material; a second tank receiving the residual etchant from the etch bath and separating the diluted etchant from the residue material; a connecting passage directly connecting the first and second tanks and directly transferring the separated diluted etchant from the second tank to the first tank; an outlet pipe

attached to the second tank, the outlet pipe discharging the residue material; and a control unit controlling the first tank, the etch bath and the second tank, the control unit terminating the etching when a temperature of the first etchant reaches a termination temperature.

In rejecting claim 1, the Examiner asserts that Nelson discloses all of the claimed elements except an etch bath including a bubble plate and etching a glass substrate by immersion therein. More specifically, the Examiner asserts that (1) the spray etcher 2 of Nelson is equivalent to the claimed first tank, (2) the rinse chamber 4 is equivalent to the claimed second tank, (3) the outlet pipe 6 is equivalent to claimed residue material outlet pipe; (4) stream 3 is equivalent to the claimed connecting passage directly connecting the first and second tank; and (5) that the ion exchange means 11 separates the diluted etchant from the residue material. Finally, the Examiner asserts that it would have been obvious to one skilled in the art to replace the spray etcher 2 of Nelson with the etch bath and bubble plate of Chung. These assertions are unfounded for the following reasons.

First, the Examiner asserts that the motivation to replace the spray etcher with the an etch bath including a bubble plate “would be to replace the etchant delivery means with an alternate and equivalent etching means,” however the Examiner fails to provide any evidence of the desirability of replacing the spray etcher of Nelson. As discussed in §2143.01 of the MPEP, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Nowhere in the prior art is there any suggestion of the desirability of replacing a spray etcher with a bubble plate. Furthermore, the Examiner asserts that the bubble plate is an alternative and equivalent etching means to the spray etcher, however, the Examiner fails to address the fact the bubble plate requires a gas supply which is not required in the spray etcher of Nelson. Accordingly, a significant redesign of the

system of Nelson would be required in order to accommodate a bubble plate (i.e., the mere replacement of the spray etcher with a etch bath is not possible). Therefore, absent proper motivation to modify the system of Nelson, the rejection of claims 1, 2, 7, 10, 11, 13, 14, 17-22, 25 and 26 is improper.

In addition, the Examiner points to multiple elements of Nelson as being equivalent to individual elements of the claimed apparatus, however the Examiner fails to address the apparatus as a whole. For example, the Examiner points to the stream 6 which flows from rinse chamber 4 of Nelson as being equivalent to the claimed outlet pipe for discharging the residue material, but points to ion exchange 11 for separating the residue material from the residual etch. Clearly, output stream 6 of chamber 4 cannot discharge the residue material if it is separated in exchange 11.

Furthermore, the Examiner points to Nelson's spray etcher 2 as being equivalent to the claimed first tank, then asserts that it would be obvious to replace the spray etcher with a bubble plate a disclosed by Chung. Accordingly, the Examiner incorrectly points to Nelson's spray etcher as being equivalent to both the first tank and the etch bath .

Since Nelson, Chung, Kanda and Allies each fail to disclose or suggest an etching apparatus for etching a glass substrate that includes a first tank, an etch bath and a second tank as claimed, the combination of these four references cannot possibly disclose or suggest said features. Therefore, even if one skilled in the art were motivated to combine Nelson, Chung, Kanda and Allies, the combination would still fail to render claim 1 unpatentable for at least the reason that the combination fails to disclose each and every claimed element.

Independent claims 11, 21 and 26 each define an etching apparatus for etching a glass substrate with an etchant that includes, *inter alia*, a first tank, an etch bath, and a second/separation tank which are substantially the same as those recited in claim 1. Therefore,

claims 11, 21 and 26 are patentably distinguishable over the combination of Nelson, Chung, Kanda, and Allies for at least those reasons presented above with respect to claim 1.

In addition, claims 2, 7, 13, 14, 17-19, and 25 variously depend from independent claims 1 and 11. Therefore, claims 2, 7, 13, 14, 17-19, and 25 are patentably distinguishable over the combination of Nelson, Chung, Kanda, and Allies for at least those reasons presented above with respect to claim 1.

Independent claim 10 defines an etching apparatus for etching a glass substrate with an etchant. The apparatus includes, *inter alia*, an etch bath receiving the substrate immersed into the etchant, the etch bat etching the glass substrate, wherein the thickness of the glass substrate is uniformly reduced; a temperature sensor installed in the etch bath, the temperature sensor measuring and monitoring a temperature of the etchant; and a control unit controlling the etch bath, the control unit connected to the temperature sensor for receiving a signal indicating a temperature of the etchant to terminate the etching when the temperature of the etchant reaches a termination temperature.

In rejecting claim 10, the Examiner asserts that Kanda discloses a process control system having a thermocouple for measuring the temperature of the etching solution used to etch a submerged substrate. In addition, the Examiner asserts that one skilled in the art would have been motivated to control the etching operation for the etching apparatus of Nelson and Chung with the chemical processing control system of Kanda and Allies in order to detect the termination of etching appropriately and precisely as taught by Kanda by an alternate and equivalent means of detecting said termination in using “reaction energy”. These assertions are unfounded for the following reasons.

First, as discussed above with respect to claim 1, the Examiner fails to provide proper motivation of modify the system of Nelson to include an etch bath. Furthermore, nowhere in

Nelson is there any suggestion of the desirability of controlling the etching process based on the temperature of the etchant. Accordingly, absent proper motivation to modify the system of the Nelson, the rejection of claim 10 is improper.

Furthermore, even if, *arguendo*, one skilled in the art were motivated to combine Nelson, Chung, Kanda and Allies as suggested by the Examiner, the combination would still fail to render claim 10 unpatentable because the combination fails to disclose each and every claimed element.

Kanda discloses controlling the etching process based on the thickness of the substrate, which is calculated based on the speed of the etching process, which in turn is based on the temperature of the etchant. The mere fact that Kanda discloses measuring the temperature of the etchant solution is not equivalent to terminating the etching process when the temperature reaches a termination temperature. Nowhere in Kanda is there any disclosure or suggestion of determining a termination temperature, much less terminating the etching process once the termination temperature has been reached.

Since Nelson, Chung, Kanda and Allies each fail to disclose or suggest an etching apparatus that includes temperature sensor and a control unit for terminating the etching process when the temperature of the etchant reaches a termination temperature, the combination of these four references cannot possibly disclosure or suggest said feature. Therefore, even if one skilled in the art were motivated to combine Nelson, Chung, Kanda and Allies the combination would still fail to render claim 10 unpatentable because the combination fails to disclose each and every claimed element.

Independent claim 22 defines an etching apparatus for etching a glass substrate that includes, *inter alia*, a temperature sensor and control unit substantially as recited in claim 10. Furthermore, claim 20 depends from independent claim 10. Accordingly, claims 20 and 22 are

patentable distinguishable over the combination of Nelson, Chung, Kanda and Allies for at least those reasons presented above with respect to claim 10.

For at least those reasons present above, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1, 2, 7, 10, 11, 13, 14, 17-22, 25 and 26 under 35 U.S.C. §103(a).

In paragraph 4 of the Action, the Examiner rejects claims 3-6, 8, 9, 12, 15, 23 and 24 under 35 U.S.C. §103(a) as allegedly being unpatentable over Nelson in view of Chung, Kanda and Allies, further in view of U.S. Patent No. 3,869,313 to Jones et al. (“Jones”). Applicant respectfully traverses this rejection.

Claims 3-6, 8, 9, 12 and 15 variously depend from independent claims 1 and 11. Therefore, claims 3-6, 8, 9, 12 and 15 are patentably distinguishable over the combination of Nelson, Chung, Kanda and Allies for at least those reasons presented above with respect to claims 1 and 11. In addition, independent claim 23 and claim 24 which depends therefrom, define an etching apparatus that includes, *inter alia*, a first tank, an etch bath and a second/separation tank as recited in claims 1 and 11. Therefore, claims 23 and 24 are patentably distinguishable over the combination of Nelson, Chung, Kanda and Allies for at least those reasons presented above with respect to claims 1 and 11.

Jones discloses an apparatus for automatic chemical processing of semi-conductors. However Jones fails to over come the deficiencies of Nelson, Chung, Kanda and Allies. Since Nelson, Chung, Kanda, Allies and Jones each fail to disclose or suggest an etching apparatus for etching a glass substrate that includes a first tank, an etch bath, and a second/separation tank as claimed, the combination of these five references cannot possibly disclose or suggest said features. Therefore, even if one skilled in the art were motivated to combine Nelson, Chung, Kanda, Allies, and Jones, the combination would still fail to render claims 3-6, 8, 9, 12, 15, 23

and 24 unpatentable for at least the reason that the combination fails to disclose each and every claimed element.

In paragraph 5 of the Action, the Examiner rejects claim 16 under 35 U.S.C. §103(a) as allegedly being unpatentable over Nelson in view of Chung, Kanda, and Allies, further in view of U.S. Patent No. 4,886,590 to Tittle (“Tittle”). Applicant respectfully traverse this rejection.

Claim 16 depends from independent claim 11. Therefore, claim 16 is patentably distinguishable over the combination of Nelson, Chung, Kanda and Allies for at least those reasons presented above with respect to claim 11. Tittle discloses a chemical process control system. However, Tittle fails to overcome the deficiencies of Nelson, Chung, Kanda, and Allies.

Since Nelson, Chung, Kanda, Allies and Tittle each fail to disclose or suggest an etching apparatus for etching a glass substrate that includes a first tank, an etch bath, and a separation tank as claimed, the combination of these five references cannot possibly disclose or suggest said features. Therefore, even if one skilled in the art were motivated to combine Nelson, Chung, Kanda, Allies, and Tittle, the combination would still fail to render claim 16 unpatentable for at least the reason that the combination fails to disclose each and every claimed element. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 16 under 35 U.S.C. §103(a).

The application is in condition for allowance. Notice of same is earnestly solicited. Should the Examiner find the application in other than condition for allowance, the Examiner is invited to call the undersigned attorney at the telephone number (202) 496 - 7500. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of

this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

Dated: January 18, 2005

Respectfully submitted,


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